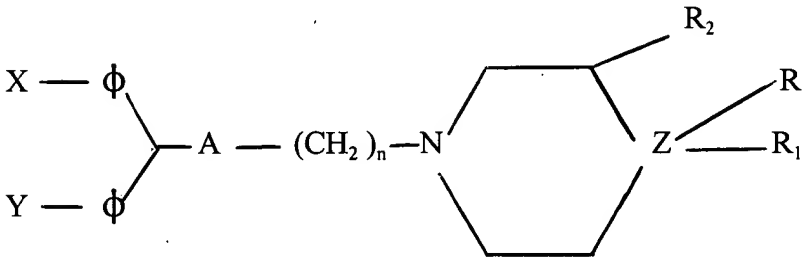
CLAIMS

1. A piperazine or piperidine dopamine, norepinephrine or serotonin ligand having the formula:

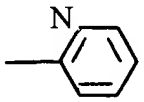
Formula I

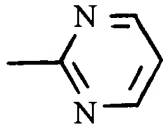


wherein:

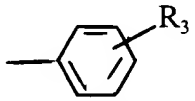
A is oxygen or nitrogen; n is an integer of 2 to 6; X and Y can be the same or different and are hydrogen, halogen, nitro, alkyl or halalkyl, Z is carbon or nitrogen;and ϕ is phenyl, naphthyl, thienyl or pyridinyl;

when Z is carbon, R is hydrogen, cyano, hydroxy, $-COOCH_3$, $-CH_2OH$ or -COOH; R_1 is 4-fluorophenyl, 4-chlorophenyl, 4-trifluoromethyl-3-chlorophenyl, 4-bromophenyl, 4-(2-keto-1-benzimidazolinyl) or 1-phenyl 1, 3, 8- triazaspiro [4,5] decan-4-one and when Z is nitrogen, R and R_1 combined are





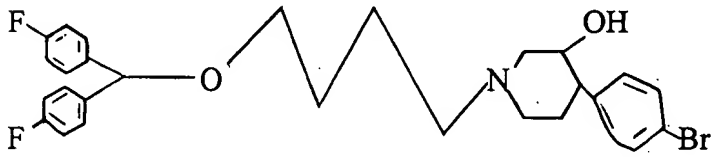
or



wherein R_3 is halo, alkyl, cyano or nitro and R_2 can be hydrogen or

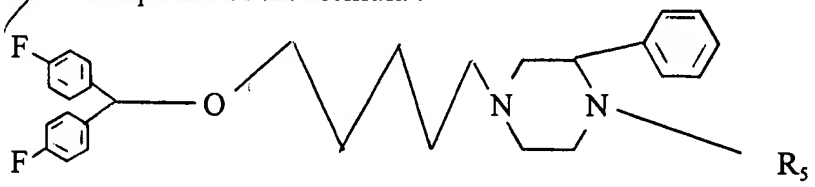
wherein R_4 is halo, alkyl, cyano, nitro, alkylnyl or alkenyl.

2. A compound of the formula :



3. A compound of the formula :

4. A compound of the formula :



wherein R_5 is hydrogen halo, alkyl, cyano or nitro.

5. The compound of any one of claims 1, 2, 3 or 4 which is labeled with a radionuclide.

6. The compound of claim 5 wherein said radionuclide is ^{99m}Tc.

7. The compound of claim 5 wherein said radionuclide is an iodine isotope.

8. The method for imaging dopamine neurons in a mammal which comprises:

administering to the mammal an imaging dose of the compound of claim 1 labeled with a radionuclide and

detecting binding of the compound in the mammal.

9. The method for imaging dopamine neurons in a mammal which comprises:

administering to the mammal an imaging dose of the compound of claim 2 labeled with a radionuclide and

detecting binding of the compound in the mammal l.

10. The method for imaging dopamine neurons in a mammal which comprises:

administering to the mammal an imaging dose of the compound of claim 3 labeled with a radionuclide and

detecting binding of the compound in the mammal.

11. The method for imaging dopamine neurons in a mammal which comprises:

administering to the mammal an imaging dose of the compound of claim 4 labeled with a radionuclide and

detecting binding of the compound in the mammal.

12. The method for imaging dopamine neurons in a mammal which comprises:

administering to the mammal an imaging dose of the compound of claim 1 labeled with a radionuclide and

detecting binding of the compound in the mammal.

13. The method for imaging dopamine neurons in an animal which comprises:

administering to the mammal an imaging dose of the compound of claim 2 labeled with a radionuclide and

detecting binding of the compound in the mammal.

14. The method of treating an mammal afflicted with cocaine abuse which comprises:

administering to the mammal an effective amount of a compound of claim 3.

15. The method of treating an animal afflicted with cocaine abuse which comprises:

administering to the mammal an effective amount of a compound of claim 4.

16. The method of treating an mammal afflicted with a neurodegenerated disease characterized by a degeneration of dopamine neurons which comprises:

administering to the mammal an effective amount of the compound of claim 1.

17. The method of treating an mammal afflicted with a neurodegenerated disease characterized by a degeneration of seratonin neurons which comprises:

administering to the mammal an effective amount of the compound of claim 2.

18. The method of treating a mammal afflicted with a neurodegenerated disease characterized by a degeneration of dopamine neurons which comprises:

administering to the mammal an effective amount of the compound of claim 3.

19. The method of treating a mammal afflicted with a neurodegenerated disease characterized by a degeneration of seratonin neurons which comprises:

administering to the mammal an effective amount of the compound of claim 4.